REMARKS

The amendment to claim 1 defining the filter as comprising a material which collects submicron particles corresponds to the teaching at page 10, lines 3-9 of applicant's specification. The definition of the spray means as putting substantially all of the sprayed water onto the two circumferential surfaces, whereby that amount of water is "consumed" in the formation of the water films, corresponds to the teaching at page 9, lines 9-20 of the specification. The spacing of the spray means relative to the air inlet is shown in Fig. 1 of the drawings.

The features recited in new claims 13 and 14 are seen in the drawings and taught at page 10, lines 3-9. Description corresponding to new claim 15 is found at page 10, line 30 to page 11, line 4. Description corresponding to new claims 16 and 17 is found at page 9, lines 9-20. For claims 18-20 see page 6, lines 12-14.

The prior art rejections are respectively traversed for the reasons which follow.

As explained in the Background and Summary of applicant's specification, applicant's invention is directed to la hybrid-type dust collector comprising a wet-type impingement scrubbing stage and a dry-type filtration stage. The wet-type impingement scrubbing stage is used to reduce the load imposed on the subsequent dry-type filtration stage. See page 2, lines 2-3 of applicant's specification. Neither Wisting nor Cox discloses or suggests a two stage apparatus for removal of airborne particulates in both stages.

As recited by amended claim 1, the filtration stage includes a filter for filtration (collection) of submicron particles entrained in the air which has been pre-treated by the scrubbing stage. As described at page 3, lines 29-34 of applicant's specification, in the case of collection of submicron size particles on a filter, the air-flow resistance and pressure drop across the filter is prohibitively increased when the filter is wetted and clogged by water droplets generated in the preceding scrubbing stage.

However, the problem of clogging by water or wetted submicron particles is addressed by provision, in the present invention, of means within the cyclone chamber for forming a film of water on each of the inner circumferential surface of the main body

and the outer circumferential surface of the partition wall. When dust-laden incoming air is brought into contact with the water films, the airborne particulate matter comes into contact with the water films and is captured therein and washed away as the water film flows down along the those circumferential surfaces.

As applicant teaches at page 9, lines 9-20 and as is now recited by claim 1, in applicant's invention the spray means is arranged so that substantially all water passed there-through impinges on the aforementioned circumferential surfaces and is consumed in the formation of the water films. Applicant's purpose in this regard is to prevent water droplets from forming within the air space between the circumferential surfaces and descending within the cyclone chamber and to thereby prevent airborne water droplets from exiting the cyclone chamber and entering the filtration chamber. In contradistinction, in operation of the Wisting apparatus, only a portion of the water spray introduced with air adheres to the internal cylindrical surfaces of the apparatus. See column 4, lines 24-30 of Wisting.

Further, in the present invention, the air inlet is located below and spaced from the spray means which further contributes to prevention of entrainment of the water within the air stream.

Thus, (1) the spray nozzles directing substantially all of the introduced water onto the internal circumferential surfaces and (2) the vertical spacing of the air inlet from the spray means, below (downstream of) the spray means, are design features of the present invention serving to prevent entrainment of water within the air stream. On the contrary, Wisting intentionally entrains all of the introduced water into the incoming air stream. See the drawings and column 4, lines 1-4. Moreover, addition of the aforementioned novel features of applicant's invention would serve no purpose in Wisting because Wisting has no second dust removal filter stage, i.e. no filter which might become clogged by water or wet submicron size particles. The nature of the "water extractor 50" (embodiment of Fig. 1) and that of the "moisture extractor 76" (Fig. 5) are not disclosed by Wisting. However, it suffices to note that neither is intended to remove dust and neither is the equivalent to applicant's submicron particle collecting filter. Further, the only rationale presented by Wisting for extractors 50 and 76 is water

removal. Water must reach 50 and 76 otherwise they would not be water or mositure extractors and would serve no known purpose. The rejection of claim 1 for anticipation by Wisting is traversed for the reason that Wisting lacks the novel features of applicant's apparatus noted above.

Further, in Wisting, it can be understood from the teaching at column col. 4, lines 23-31 that the portion of the incoming entrained water spray (the embodiment of Fig. 1) or steam (the embodiment of Fig. 5) which does not wet the apparatus surfaces escapes the cyclone chamber, as further attested to by the names of the elements downstream of the cyclone chamber, i.e. "water extractor" and "moisture extractor". Accordingly, if a filter were to be installed downstream of the cyclone, i.e. downstream of scrubbing chambers 26, 27 and 28, that filter would be wetted (as are 50 and 76 in Wisting) and would become clogged right away and any air flow across the filter would have a very large pressure drop.

The rejection of claims 1, 2, 6 and 9 for obviousness over Cox in view of Wisting is traversed for substantially the same reasons given above. As in Wisting, in Cox there is a spray directly into the air space within the cyclone, rather than directly against interior surfaces of the apparatus, i.e. as in Wisting, water is intentionally entrained within the air stream. Further, Cox shows only one of many nozzles 36 located above air inlet 20. Still further, Cox has no filter and, as noted above the water/moisture extractors of Wisting would not include a filter material which collects submicron particles. Accordingly, regardless of the manner in which features of the two references might be combined, the combination would lack the aforementioned features of the present invention. If the water/moisture extractor of Wisting were combined with Cox **and** adapted to collect submicron particles or replaced by a filter having that capability, because it would wetted it would instantly become clogged and, accordingly, there exists no reason for making such a combination and adaptation. Further, the combination/adaptation would still lack a spray means as defined by amended claim 1.

In conclusion, it is respectfully requested that the Examiner reconsider the rejections of record in light of the present amendments and foregoing comments.

Respectfully submitted,
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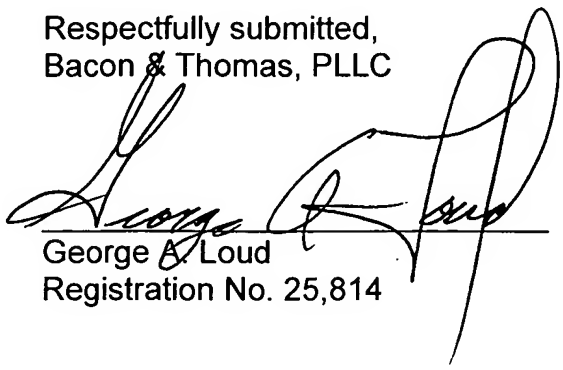

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